Comparative study between Transvaginal sonography and Hysterosalpingography in testing tubal patency

Thesis

Submitted in partial Fulfillment for the Degree of M.Sc. of

(Gynaecology & Obstetrics)

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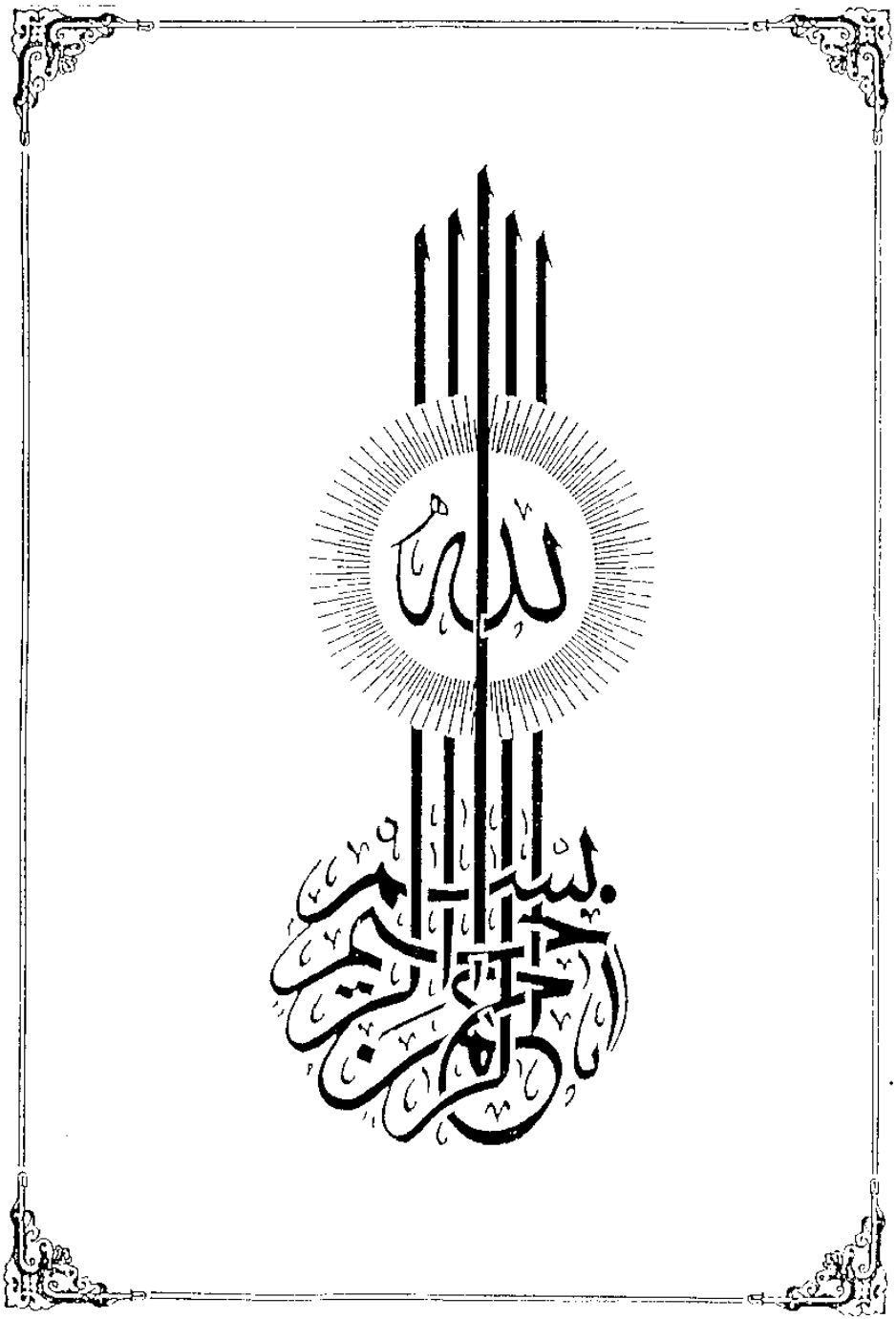
1995



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Acknowldgement

It is a genuine pleasure to acknowledge the efficient and whole hearted supervision of Prof. Dr. Mohomed Yehia, Lect. Dr. Magdi Abd El Gawad and Lect. Dr. Hana Hamdy Nasef

They all meticulously guided this work in all of its aspects from the beginning to completion.

Introduction

Infertility, as defined by the inability to conceive after one year of regular coitus and no use of any contraceptive method, affects approximately 10 to 20% of couples in the united states *(Sperroff et al., 1989).* The infertility specialist now encounters the results of inflammatory disease of the oviduct far more often than in past. Low sperm counts have become common place, and abnormal semen-mucus interaction is a frequent consideration *(Behrman, 1982).* A male factor is responsible for 40% to 50% of infertile couples. Occlusive tubal disease and uterine disease in 35% to 50%, ovulatory disorders in 30%, cervical problems, immunological factor and infectious disease in about 50% *(Blackwell and Stein Kampf, 1989).* 20% of infertility is unexplained *(Coulam et al., 1988).*

Forty-six percent of female infertility that has lasted more than 2 years has a tubal factor in it. In two thirds of these cases a total organic block exists. The remaining one third consists of stenotic lesions or peritubal adhesions or dysfunction which can often be treated with non-operative therapy. In 32%, the site of the obstruction is at the internal end, in 52% is at the external opening and in 16% between the two.*(Elliot and Barry, 1981).* The principal aetiologic forms of tubal obstruction are :-

post delivery, post-abortal tubal obstruction, tubal obstruction of tuberculous origin, Bilharzial tubal obstruction gonococcal tubal obstruction, tubal obstruction caused by endometriosis, tubal obstruction due to extra-genital peritonitis and finally spasmodic tubal occlusion may possibly contribute to infertility *(Elliot and Barry, 1981).*

There are three principle methods used in the anatomical and physiological study of the uterus and the tubes in infertile women :-

1- Kymographic utero-tubal insufflation which gives a preliminary idea

about the patency of the tube

2- Hysterosalpingography :-

It provides pictures of the cavities of the uterus and the tube and o: the passage and dispersion of the dyes from the fimbriated ends. It gives precise data about the sites of the strictures, the state of the tubal mucosa and may show abnormalities of the uterus such as malformation, synechiae and polyps.

3- Laparoscopy :-

It shows the outer aspects and the true state of the organs in the pelvis. By using coloured dyes, tubal patency can be studied in detail.

There are three other recent methods used to evaluate the state of the fallopian tubes in the infertile woman. These recent methods are :-

I- Hysteroscopy :-

The tubal ostia can be examined by hysteroscopy. However, hysteroscopy is a poor indicator of tubal patency and the integrity of the intramural and isthmic portion of the tube must be assessed by HSG and laparoscopy ***(Brosens, 1991).***

II- Transvaginal Sonography :-

More recently, the transvaginal sonography is used in detection of tubal patency which is termed "sonosalpingography". During this procedure sterile fluid e.g. saline is injected transcervically and can be identified in the Douglas pouch indicating at least, patency of one tube. Also masses in the pelvis can be visualized using ultrasound ***(Richman, 1984).***

III- Salpingoscopy :-

It is a new endsocpic technique. It has been developed to gain access to the tubal lumen and to examine the tubal mucosa before tubal surgery is performed ***(Brosens, 1991)***

REVIEW OF LITERATURE

Anatomical and Physiological Considerations

*** The anatomy of the fallopian tube (oviduct)**

At the very onset, the term "tube" itself is a misnomer derived from an error in translation. When, in 1561, Gabriele Fallopio described the "Uteri tuba" he did most certainly not mean a tube in the sense in which the word is used to designate a mailing tube or the tubes of the London sub way. The term "tuba", to him, meant "trumpet" and he was alluding to the fimbria, which were in his word, like the fringe of a well-worn garment, but when carefully opened up, it resembles the orifice of a brass trumpet ***(Graham, 1951).***

The two fallopian tubes are oviducts which extend from the ovaries to the cornua of the uterus, one on either side. They are somewhat tortuous and their outer parts curve backward. Each lies in the free upper border of the broad ligament and when straightened, is 10 cm in length. Its lumen communicates with the uterine cavity at its inner end and with the peritoneal cavity at its outer end, and thus provides the final section of an open, or potentially open canal which leads from the exterior to the abdominal cavity ***(Jeffcoate, 1987).***

The fallopian tube is divided into four parts from medial to lateral as follows :-

1- Interstitial or intramural part :-

It is the innermost part of the tube that traverses the myometrium to open into the endometrial cavity. It is the shortest (1-2cm) and the narrowest (1mm) part of the tub

. It is different from the remainder of the tube in that it is without a peritoneal coat, and in that the outer longitudinal muscle has disappeared to cover the uterus. H.S.G shows a slight dilatation

of about 2-3 mm just behind the uterine opening, which itself shows up as a sort of mucous diaphragm that some interpret as a sphincter, which, however, histologists have never found *(Elliot and Barry, 1981).*

2- Isthmus :-

This is the straight and narrow portion adjacent to the uterus and measures 2-3 cm. It has thick wall but the lumen is so narrow that it will only admit the finest probe (1-2 mm in diameter) but as its mucosa is thrown into about 4 primary folds the average lumen dimater is 400 microns.

It acts as a utero-tubal sphincter with 3 muscle layers, inner and outer longitudinal and middle circular.

3- Ampulla :-

This is the wider, thin-walled and tortuous outer portion, approximately 5 cm in length and 1-2 mm medially up to 10 mm laterally in diameter. Its mucosa forms complex folds of epithelium. The inner longitudinal muscle consists of scattered bundles within the lamina propria of the mucosa, while the middle circular and outer longitudinal muscle bundles form a well defined layers. The ampulla leads to the infundibulum.

4- Infundibulum :-

The is the trumpet - shaped outer end with an opening into the peritoneal cavity (abdominal ostium). The later is surrounded by fronds or fimbriae, one of which is longer than the others and is directed towards the ovary (fimbria ovarica) or "Fringe of Richard". The length of fimbria ovarica is about 20-30 mm long. When the fringes are stretched out, they can sweep about two thirds of the surface of the ovary. The fimbriated extremity is free of the broad ligament and curls back on itself so that its fimbriae aim to embrace the ovary , this is important to fertility.

Histological structure :-

Except for a narrow strip opposite to its attachment to the broad ligament, the extra uterine part of the fallopian tube is covered with peritoneum.

Beneath the peritoneal covering, there are an outer longitudinal layer and an inner circular layer of involuntary muscle. The muscle zone is thick at the isthmus and thin at the ampulla. It is separated from the mucosal lining of the lumen (endosalpinx) by a delicate connective tissue submucosa.

The mucous membrane is arranged in the interstitial and isthmic portions of the tube in four of fine main longitudinal ridges, but these develop subsidiary folds or plicae to form a very complicated arborescence in the ampullary portion. It is lined by low columnar or cubical cells supported by a thin stroma and contains finely granular pale cytoplasm with perinuclear clearing.

About half the epithelial cells, especially in the outer parts of the tube, are ciliated and create a current. This combined with peristaltic action of the muscle, propel the ovum towards the uterus. Most of the other epithelial cells have a secretory function, which is achieved by cytoplasmic and nuclear extrusion. The resulting product is a serous fluid rich in protein with high level of bicarbonate and pyruvates, which may be nutritive to the fertilized ovum. A third type of epithelial cell is "peg-shaped" or intercalary, its function is doubtful. They are compressed between neighbouring secretory and ciliated cells and may represent exhausted secretory cells.

A fourth type of the epithelial cells, are the basal (indifferent or wandering) cells. They are located in the deeper part of the epithelium. They may be of reticuloendothelial origin or may represent reserve cells that can differentiate into secretory cells.

Both the muscular and secretory activities of the tube are under the influence of ovarian hormones and therefore show cyclical changes during the menstrual life of a woman as follows :-

- Following menstruation the tubal epithelium is low and the cells are of the same level.

- In the proliferative phase :- The height of the epithelium gradually increases and the ciliated cells reach their greatest development.

- During the secretory phase :- The secretory cells continue to increase in height protruding as a dome above the luminal border of the lower and broader ciliated cells.

* During pregnancy: The epithelium becomes very low and flat.
* Before puberty and after menopause: The tube is functionally quiet.

Tubal Physiology

The fallopian tube has the major reproductive functions. These functions and their influence on the spermatozoa, ova, and later on, on the zygote are important in the safe and reliable conduct of in vivo fertilization ***(Jerome, 1979).***

For the sperm, the tube is needed for selection, dilution and maturation of healthy spermatozoa. The nutrition, respiration and metabolic requirements must be provided. Capacitation or the acquired